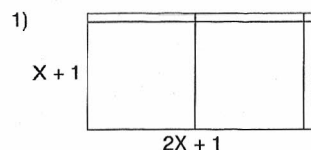
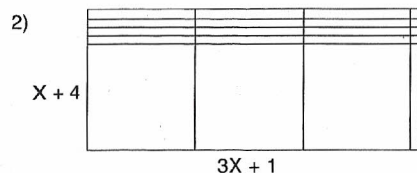


22A

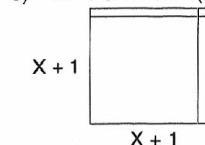


$$\begin{array}{r} 2X + 1 \\ \times \quad X + 1 \\ \hline 2X^2 + X \\ 2X^2 + 3X + 1 \end{array}$$

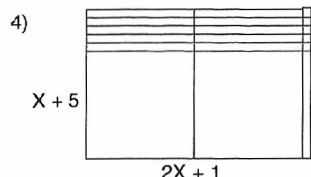


$$\begin{array}{r} 3X + 1 \\ \times \quad X + 4 \\ \hline 12X + 4 \\ 3X^2 + X \\ 3X^2 + 13X + 4 \end{array}$$

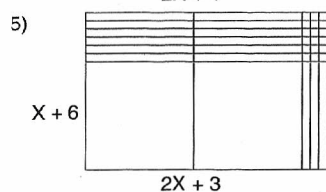
3) $4X^2 + 8X + 4 = 4(X^2 + 2X + 1)$



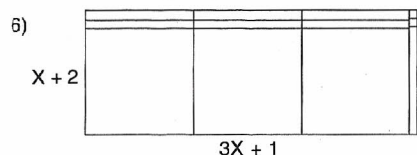
$$\begin{array}{r} X + 1 \\ \times \quad X + 1 \\ \hline X^2 + X \\ X^2 + 2X + 1 \end{array}$$



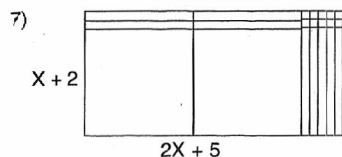
$$\begin{array}{r} 2X + 1 \\ \times \quad X + 5 \\ \hline 10X + 5 \\ 2X^2 + X \\ 2X^2 + 11X + 5 \end{array}$$



$$\begin{array}{r} 2X + 3 \\ \times \quad X + 6 \\ \hline 12X + 18 \\ 2X^2 + 3X \\ 2X^2 + 15X + 18 \end{array}$$

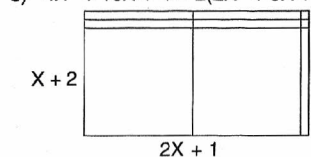


$$\begin{array}{r} 3X + 1 \\ \times \quad X + 2 \\ \hline 6X + 2 \\ 3X^2 + X \\ 3X^2 + 7X + 2 \end{array}$$



$$\begin{array}{r} 2X + 5 \\ \times \quad X + 2 \\ \hline 4X + 10 \\ 2X^2 + 5X \\ 2X^2 + 9X + 10 \end{array}$$

8) $4X^2 + 10X + 4 = 2(2X^2 + 5X + 2)$



$$\begin{array}{r} 2X + 1 \\ \times \quad X + 2 \\ \hline 4X + 2 \\ 2X^2 + X \\ 2X^2 + 5X + 2 \end{array}$$

9) $(2X + 3)(X + 3)$
Drawings for #9-16 are not shown.
The student should continue to build the problems as illustrated at left.

$$\begin{array}{r} 2X + 3 \\ \times \quad X + 3 \\ \hline 6X + 9 \\ 2X^2 + 3X \\ 2X^2 + 9X + 9 \end{array}$$

10) $(4X + 1)(X + 2)$

$$\begin{array}{r} 4X + 1 \\ \times \quad X + 2 \\ \hline 8X + 2 \\ 4X^2 + X \\ 4X^2 + 9X + 2 \end{array}$$

11) $(3X + 4)(X + 2)$

$$\begin{array}{r} 3X + 4 \\ \times \quad X + 2 \\ \hline 6X + 8 \\ 3X^2 + 4X \\ 3X^2 + 10X + 8 \end{array}$$

12) $2(X^2 + 7X + 10) = 2(X + 2)(X + 5)$

$$\begin{array}{r} X + 2 \\ \times \quad X + 5 \\ \hline 5X + 10 \\ X^2 + 2X \\ X^2 + 7X + 10 \end{array}$$

13) $(2X + 1)(X + 3)$

$$\begin{array}{r} 2X + 1 \\ \times \quad X + 3 \\ \hline 6X + 3 \\ 2X^2 + X \\ 2X^2 + 7X + 3 \end{array}$$

14) $(4X + 3)(X + 1)$

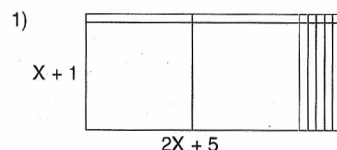
$$\begin{array}{r} 4X + 3 \\ \times \quad X + 1 \\ \hline 4X + 3 \\ 4X^2 + 3X \\ 4X^2 + 7X + 3 \end{array}$$

15) $(2X + 9)(X + 2)$

$$\begin{array}{r} 2X + 9 \\ \times \quad X + 2 \\ \hline 4X + 18 \\ 2X^2 + 9X \\ 2X^2 + 13X + 18 \end{array}$$

16) $(3X + 4)(X + 3)$
(Check as above)

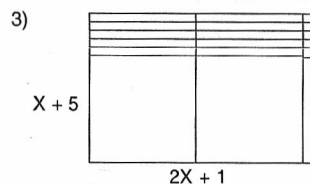
22B



$$\begin{array}{r} 2X + 5 \\ \times \quad X + 1 \\ \hline 2X^2 + 5X \\ 2X^2 + 7X + 5 \end{array}$$

2) $(5X + 2)(X + 3)$

$$\begin{array}{r} 5X + 2 \\ \times \quad X + 3 \\ \hline 15X + 6 \\ 5X^2 + 2X \\ 5X^2 + 17X + 6 \end{array}$$

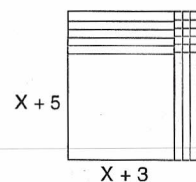


$$\begin{array}{r} 2X + 1 \\ \times \quad X + 5 \\ \hline 10X + 5 \\ 2X^2 + X \\ 2X^2 + 11X + 5 \end{array}$$

4) $(4X + 1)(X + 3)$

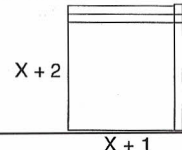
$$\begin{array}{r} 4X + 1 \\ \times \quad X + 3 \\ \hline 12X + 3 \\ 4X^2 + X \\ 4X^2 + 13X + 3 \end{array}$$

5) $2(X^2 + 8X + 15) = 2(X + 3)(X + 5)$

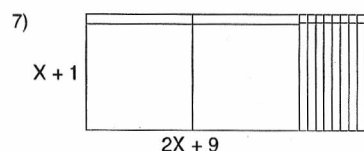


$$\begin{array}{r} X + 5 \\ \times \quad X + 3 \\ \hline 3X + 15 \\ X^2 + 5X \\ X^2 + 8X + 15 \end{array}$$

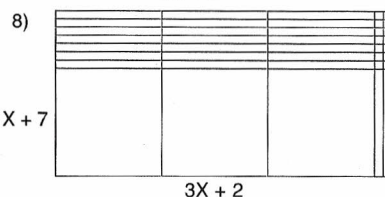
6) $3(X^2 + 3X + 2) = 3(X + 1)(X + 2)$



$$\begin{array}{r} X + 1 \\ \times \quad X + 2 \\ \hline 2X + 2 \\ X^2 + X \\ X^2 + 3X + 2 \end{array}$$



$$\begin{array}{r} 2X + 9 \\ \times \quad X + 1 \\ \hline 2X + 9 \\ 2X^2 + 9X \\ 2X^2 + 11X + 9 \end{array}$$



$$\begin{array}{r} 3X + 2 \\ \times \quad X + 7 \\ \hline 21X + 14 \\ 3X^2 + 2X \\ 3X^2 + 23X + 14 \end{array}$$

9) $(2X + 3)(X + 5)$
The student should continue to build the problems as illustrated at left.

$$\begin{array}{r} 2X + 3 \\ \times \quad X + 5 \\ \hline 10X + 15 \\ 2X^2 + 3X \\ 2X^2 + 13X + 15 \end{array}$$

10) $5(X + 7)(X + 3)$

$$\begin{array}{r} X + 7 \\ \times \quad X + 3 \\ \hline 3X + 21 \\ X^2 + 7X \\ X^2 + 10X + 21 \end{array}$$

11) $6(X + 4)(X + 2)$

$$\begin{array}{r} X + 4 \\ \times \quad X + 2 \\ \hline 2X + 8 \\ X^2 + 4X \\ X^2 + 6X + 8 \end{array}$$

12) $(3X + 8)(X + 2)$

$$\begin{array}{r} 3X + 8 \\ \times \quad X + 2 \\ \hline 6X + 16 \\ 3X^2 + 8X \\ 3X^2 + 14X + 16 \end{array}$$

13) $2(2X + 1)(X + 3)$

$$\begin{array}{r} 2X + 1 \\ \times \quad X + 3 \\ \hline 6X + 3 \\ 2X^2 + X \\ 2X^2 + 7X + 3 \end{array}$$

14) $(5X + 2)(X + 1)$

$$\begin{array}{r} 5X + 2 \\ \times \quad X + 1 \\ \hline 5X + 2 \\ 5X^2 + 2X \\ 5X^2 + 7X + 2 \end{array}$$

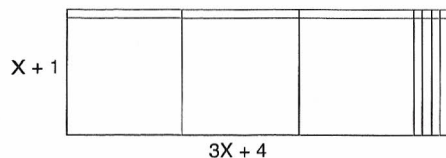
15) $(10X + 1)(X + 1)$

$$\begin{array}{r} 10X + 1 \\ \times \quad X + 1 \\ \hline 10X + 1 \\ 10X^2 + X \\ 10X^2 + 11X + 1 \end{array}$$

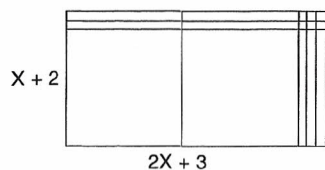
16) $(4X + 3)(X + 5)$
(Check as above)

22C

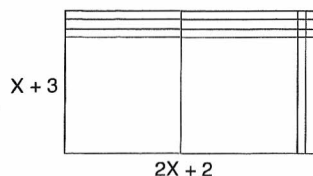
1) $(3X + 4)(X + 1)$



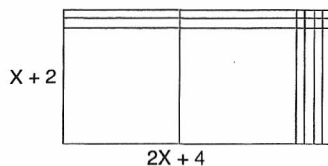
2) $(2X + 3)(X + 2)$



3) $2X^2 + 8X + 6$



4) $2X^2 + 8X + 8$



5) $(3X + 4)(X + 3)$

6)
$$\begin{array}{r} 3X + 4 \\ \times X + 3 \\ \hline 9X + 12 \\ 3X^2 + 4X \\ \hline 3X^2 + 13X + 12 \end{array}$$

7) $4(X^2 + 6X + 9) = 4(X + 3)(X + 3)$

8)
$$\begin{array}{r} X + 3 \\ \times X + 3 \\ \hline 3X + 9 \\ X^2 + 3X \\ \hline X^2 + 6X + 9 \end{array}$$

9) $(2X + 1)(2X + 3)$

10)
$$\begin{array}{r} 2X + 1 \\ \times 2X + 3 \\ \hline 6X + 3 \\ 4X^2 + 2X \\ \hline 4X^2 + 8X + 3 \end{array}$$

11) $B^{2+6-5} = B^3$

12) $AB+C$

13) $X^{-3}Y^2X^{-1}Y^3X^5 = XY^5$

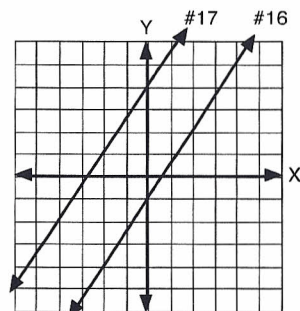
14) $A^3A^{-2}B^1B^2A^{-4} = A^{-3}B^3$

15) $6 \times 1,000,000 + 8 \times 10,000 + 2 \times 1,000 + 7 \times 1/100 = 6,082,000.07$

16) $Y = 3/2 X - 1$
see graph

17) $m = 3/2$

$$\begin{aligned} (4) &= 3/2(0) + b \\ b &= 4 \\ Y &= 3/2 X + 4 \quad \text{or} \quad 3X - 2Y = -8 \\ &\text{see graph} \end{aligned}$$



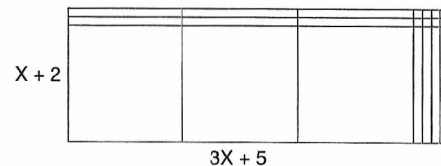
hrs	amoeba
1	2
2	4
3	8
4	16

hrs	amoeba
1	2 ¹
2	2 ²
3	2 ³
4	2 ⁴

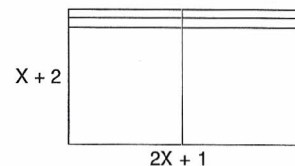
20) $6 \text{ hours} = 2^6$
 $X \text{ hours} = 2^X$

22D

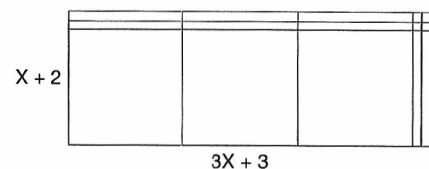
1) $(3X + 5)(X + 2)$



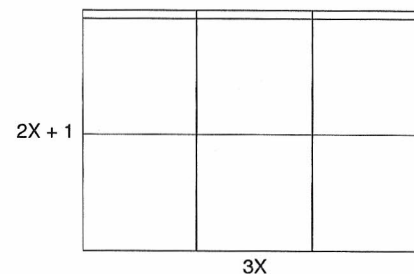
2) $2(2X^2 + 5X + 2) = 2(2X + 1)(X + 2)$



3) $3X^2 + 9X + 6$



4) $6X^2 + 3X$



5) $(3X + 5)(X + 1)$

6)
$$\begin{array}{r} 3X + 5 \\ \times X + 1 \\ \hline 3X + 5 \\ 3X^2 + 5X \\ \hline 3X^2 + 8X + 5 \end{array}$$

7) $(4X + 7)(X + 1)$

8)
$$\begin{array}{r} 4X + 7 \\ \times X + 1 \\ \hline 4X + 7 \\ 4X^2 + 7X \\ \hline 4X^2 + 11X + 7 \end{array}$$

9) $(X + 3)(X + 2)$

10)
$$\begin{array}{r} X + 3 \\ \times X + 2 \\ \hline 2X + 6 \\ X^2 + 3X \\ \hline X^2 + 5X + 6 \end{array}$$

11) $C^{-4+3+0} = C^{-1}$

12) $8^{5-3} = 8^2$

13) $B^5B^2C^{-5}B^4C^3 = B^{11}C^{-2}$

14) $D^6C^{-4}D^2D^4C^0C^{-2} = C^{-6}D^{12}$

15) $8 \times 10^4 + 6 \times 10^3 + 9 \times 10^2 + 4 \times 10^{-1}$

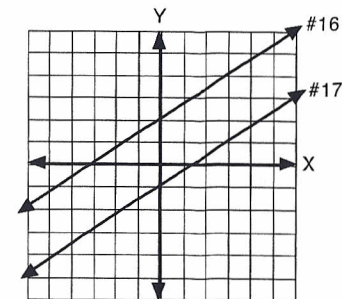
16) $Y = 2/3 X + 2$
see graph

17) $m = 2/3$

$$\begin{aligned} (-3) &= 2/3(-3) + b \\ b &= -1 \end{aligned}$$

$$Y = 2/3 X - 1 \quad \text{or} \quad 2X - 3Y = 3$$

see graph



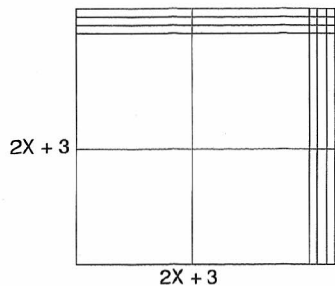
weeks	dollars
2	\$9
3	\$27
4	\$81
5	\$243

weeks	dollars
1	3 ¹
2	3 ²
3	3 ³
4	3 ⁴
5	3 ⁵

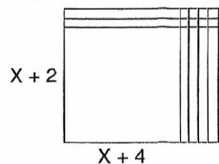
20) $20 \text{ weeks} = 3^{20}$
 $= \$3,486,800,000$ (May be shown on your calculator as 3.4868×10^9)

22E

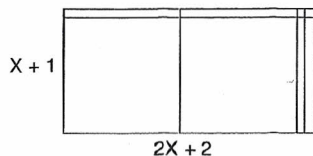
1) $(2X + 3)(2X + 3)$



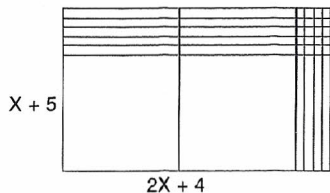
2) $2(X^2 + 6X + 8) = 2(X + 4)(X + 2)$



3) $2X^2 + 4X + 2$



4) $2X^2 + 14X + 20$



5) $(4X + 3)(X + 2)$

6)
$$\begin{array}{r} 4X + 3 \\ \times \quad X + 2 \\ \hline 8X + 6 \\ 4X^2 + 3X \\ \hline 4X^2 + 11X + 6 \end{array}$$

7) $(2X + 1)(X + 5)$

8)
$$\begin{array}{r} 2X + 1 \\ \times \quad X + 5 \\ \hline 10X + 5 \\ 2X^2 + X \\ \hline 2X^2 + 11X + 5 \end{array}$$

9) $(X + 3)(X + 1)$

10)
$$\begin{array}{r} X + 3 \\ \times \quad X + 1 \\ \hline X + 3 \\ X^2 + 3X \\ \hline X^2 + 4X + 3 \end{array}$$

11) $B^2 + 6 \cdot 5C^2 \cdot 5 = B^3C^3$

12) $Y^5 + A$

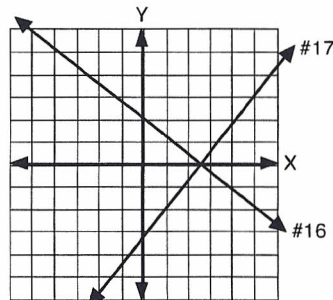
13) $D^8C^3A^2A^0D^7C^2 = A^2C^3D^{15}$

14) $A^5D^6A^7C^3D^8 = A^2C^3D^2$

15) $3 \times 100,000 + 5 \times 1 + 2 \times 1/100 + 8 \times 1/1000 = 300,005.028$

16) $Y = -4/5 X + 2$
see graph

17) $m = 5/4$
 $(-2) = 5/4(1) + b$
 $b = -13/4$
 $Y = 5/4 X - 13/4$ or $5X - 4Y = 13$
see graph

18)

day	grams
1	5
2	25
3	125
4	625

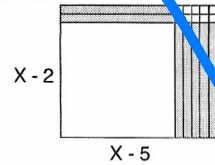
19)

day	grams
1	5 ¹
2	5 ²
3	5 ³
4	5 ⁴

20) 8 days = 5^8
Y days = 5^Y

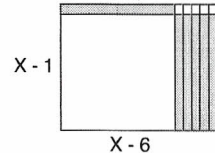
23A

1) $(X - 5)(X - 2)$



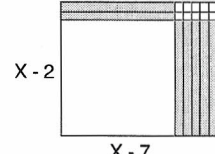
$$\begin{array}{r} X - 5 \\ \times \quad X - 2 \\ \hline -2X + 10 \\ X^2 - 5X \\ \hline X^2 - 7X + 10 \end{array}$$

2) $(X - 6)(X - 1)$



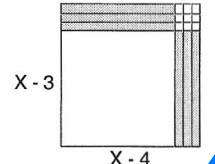
$$\begin{array}{r} X - 6 \\ \times \quad X - 1 \\ \hline -X + 6 \\ X^2 - 6X \\ \hline X^2 - 7X + 6 \end{array}$$

3) $(X - 7)(X - 2)$



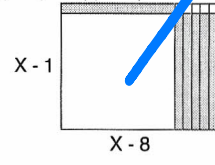
$$\begin{array}{r} X - 7 \\ \times \quad X - 2 \\ \hline -2X + 14 \\ X^2 - 7X \\ \hline X^2 - 9X + 14 \end{array}$$

4) $(X - 4)(X - 3)$



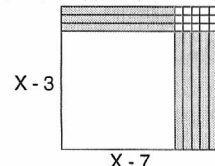
$$\begin{array}{r} X - 4 \\ \times \quad X - 3 \\ \hline -3X + 12 \\ X^2 - 4X \\ \hline X^2 - 7X + 12 \end{array}$$

5) $(X - 8)(X - 1)$



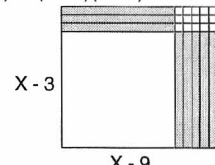
$$\begin{array}{r} X - 8 \\ \times \quad X - 1 \\ \hline -X + 8 \\ X^2 - 8X \\ \hline X^2 - 9X + 8 \end{array}$$

6) $(X - 7)(X - 3)$



$$\begin{array}{r} X - 7 \\ \times \quad X - 3 \\ \hline -3X + 21 \\ X^2 - 7X \\ \hline X^2 - 10X + 21 \end{array}$$

7) $(X - 9)(X - 3)$



$$\begin{array}{r} X - 9 \\ \times \quad X - 3 \\ \hline -5X + 27 \\ X^2 - 9X \\ \hline X^2 - 12X + 27 \end{array}$$

8) $(X - 5)(X - 6)$

$$\begin{array}{r} X - 5 \\ \times \quad X - 6 \\ \hline -6X + 30 \\ X^2 - 5X \\ \hline X^2 - 11X + 30 \end{array}$$

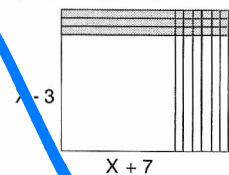
9) $(X - 9)(X - 10)$

$$\begin{array}{r} X - 9 \\ \times \quad X - 10 \\ \hline -10X + 90 \\ X^2 - 9X \\ \hline X^2 - 19X + 90 \end{array}$$

10) $(X - 11)(X - 3)$

$$\begin{array}{r} X - 11 \\ \times \quad X - 3 \\ \hline -3X + 33 \\ X^2 - 11X \\ \hline X^2 - 14X + 33 \end{array}$$

11) $(X + 7)(X - 3)$



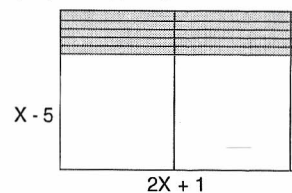
$$\begin{array}{r} X + 7 \\ \times \quad X - 3 \\ \hline -3X - 21 \\ X^2 + 7X \\ \hline X^2 + 4X - 21 \end{array}$$

12) $(X + 1)(X - 5)$ Continue to check by multiplying.

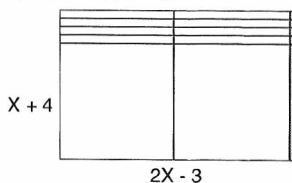
13) $(X + 6)(X - 3)$

14) $(X - 9)(X + 4)$

15) $(2X + 1)(X - 5)$



16) $(2X - 3)(X + 4)$



3E

$$1) -2X + 7 + 3X - 4 = 10 - 1$$

$$X + 3 = 9$$

$$X = 6$$

$$2) 3Y + 8 - 2 - 2Y = 9 - 4 + 5$$

$$Y + 6 = 10$$

$$Y = 4$$

$$3) 2X - 2 + 7 + X - X = 6 + 6 - 1$$

$$2X + 5 = 11$$

$$2X = 6$$

$$X = 3$$

$$4) -2B + 3 + 5B + 1 = 2(3 + 2) + 9$$

$$3B + 4 = 2(5) + 9$$

$$3B = 19 - 4$$

$$3B = 15$$

$$B = 5$$

$$5) 3Q - 2 + Q = 3(2 + 2) - 2$$

$$4Q - 2 = 3(4) - 2$$

$$4Q = 12$$

$$Q = 3$$

$$6) 5X + 5 - X - 3 = 3X - X + 4(2)$$

$$4X + 2 = 2X + 8$$

$$2X = 6$$

$$X = 3$$

$$7) 2Y - 4 + Y + 9 = -2Y - 4 + 4Y + 11$$

$$3Y + 5 = 2Y + 7$$

$$3Y - 2Y = 7 - 5$$

$$Y = 2$$

$$8) -4Q + 2 + 5Q + 2 = 3Q - 6$$

$$Q + 4 = 3Q - 6$$

$$4 = 2Q - 6$$

$$10 = 2Q$$

$$5 = Q$$

$$9) (7 - 3)^2 \times 3 - 7 =$$

$$(4)^2 \times 3 - 7 = 16 \times 3 - 7 = 41$$

$$10) 8 + (5 + 4)^2 \times 2 + 11^2 =$$

$$8 + 9^2 \times 2 + 121 = 8 + 81 \times 2 + 121 =$$

$$8 + 162 + 121 = 291$$

$$11) (4 \times 8 - 6 + 3^2) + (3 - 6 - 7^2 \times 3 + 4) =$$

$$(4 \times 8 - 6 + 9) + (3 - 6 - 49 \times 3 + 4) =$$

$$(32 - 6 + 9) + (3 - 6 - 147 + 4) =$$

$$35 + (-146) = -111$$

$$12) (15 - 6 + 8^2 + 3 \div 3) - (10 + 9^2 - 40 \div 8) =$$

$$(15 - 6 + 64 + 3 \div 3) - (10 + 81 - 40 \div 8) =$$

$$(15 - 6 + 64 + 1) - (10 + 81 - 5) =$$

$$74 - 86 = -12$$

$$13) \frac{3}{4} \times \frac{8}{3} \div \frac{2}{1} =$$

$$\frac{3}{\cancel{4}} \times \frac{\cancel{8}^2}{\cancel{3}} \times \frac{1}{\cancel{2}} = \frac{1}{1} = 1$$

$$14) \begin{array}{r} 1.7 \\ .8 \\ \hline 5 \\ 86 \end{array}$$

1.36 (two decimal places in answer)

$$15) (-19)(6) = -114$$

$$16) -6^2 = -(6)(6) = -36$$

$$17) -[-(-6)] = -[+6] = -6$$

$$18) -7 - (-3) = -7 + 3 = -4$$

$$19) 3, 6 = 2 \times 3, 8 = 2 \times 2 \times 2,$$

$$\text{so LCM} = 2 \times 2 \times 2 \times 3 = 24$$

$$\frac{3}{(24)} \frac{7}{8} + \frac{8}{(24)} \frac{2}{3} \times = \frac{4}{(24)} \frac{1}{6}$$

$$21 + 16X = 4, 16X = -17, X = -1 \frac{1}{16}$$

$$20) 10 = 10, 100 = 10 \times 10$$

$$\text{LCM} = 10 \times 10 = 100$$

$$100(.03X) - 100(.6) = 100(.75)$$

$$3X - 60 = 75$$

$$3X = 135, X = 45$$

4A

$$1) 5(-4 + 3) = 5(4) + 5(3)$$

$$2) 6(2 + 3 + 1) = 6(2) + 6(3) + 6(1)$$

$$3) 7(A + B) = 7A + 7B$$

$$4) 3(4C + 3B) = 3(4C) + 3(3B)$$

$$5) 5(2X + 3Y - 3 + 4X) =$$

$$5(2X) + 5(3Y) - 5(3) + 5(4X)$$

$$6) 8(A + 3B + 8 + 4A) =$$

$$8(A) + 8(3B) + 8(8) + 8(4A)$$

$$7) 6X + 6Y = 6(X + Y)$$

$$8) 8A + 16B = 8(A + 2B)$$

$$9) 14X + 21Y = 7(2X + 3Y)$$

$$10) -2M - 6N = -2(M + 3N)$$

$$11) 6B + 18C = 6(B + 3C)$$

$$12) 15X + 10A = 5(3X + 2A)$$

$$13) 5X + 15 = 45$$

$$5(X + 3) = 5(9)$$

$$X + 3 = 9, X = 6$$

$$14) 10X + 16 = 26$$

$$2(5X + 8) = 2(13)$$

$$5X + 8 = 13, 5X = 5, X = 1$$

$$15) 13Y - 16 + 39Y = 52$$

$$13(Y - 2 + 3Y) = 13(4)$$

$$4Y - 2 = 4$$

$$Y = 6, Y = 1 \frac{1}{2}$$

$$16) 8A - 10 - 6A = 14$$

$$2(4A - 5 - 3A) = 2(7)$$

$$A - 5 = 7, A = 12$$

$$17) 12X + 21 = 30$$

$$3(4X + 7) = 3(10)$$

$$4X + 7 = 10$$

$$4X = 3, X = \frac{3}{4}$$

$$18) 8X - 28 = 12$$

$$4(2X - 7) = 4(3)$$

$$2X - 7 = 3$$

$$2X = 10, X = 5$$

4B

$$1) 8(5 + 2) = 8(5) + 8(2)$$

$$2) 5(4 - 3 + 2) = 5(4) - 5(3) + 5(2)$$

$$3) 9(C + D) = 9(C) + 9(D)$$

$$4) 5(2C + 4D) = 5(2C) + 5(4D)$$

$$5) 3(X + Y + 4X) = 3(X) + 3(Y) + 3(4X)$$

$$6) -2(3X + 2Y + Y) =$$

$$(-2)(3X) + (-2)(2Y) + (-2)(Y)$$

$$7) 5X + 12Y = 4(2X + 3Y)$$

$$8) -7X - 21Y = 7(-X - 3Y) \text{ or } -7(X + 3Y)$$

$$9) 18A + 24B = 6(3A + 4B)$$

$$10) 8X + 10 = 16$$

$$2(4X + 5) = 2(8)$$

$$11) 6A + 3 = 15$$

$$3(2A + 1) = 3(5)$$

$$12) 8A + 10 = 20$$

$$2(4A + 5) = 2(10)$$

$$13) 8X + 32 = 40$$

$$8(X + 4) = 8(5)$$

$$X + 4 = 5, X = 1$$

$$14) 18Y + 27 = 45$$

$$9(2Y + 3) = 9(5)$$

$$2Y + 3 = 5,$$

$$2Y = 2, Y = 1$$

$$15) 15X - 10 + 5X = 25$$

$$5(3X - 2 + X) = 5(5)$$

$$4X = 7, X = 1 \frac{3}{4}$$

$$16) 9C - 6 - 12C = 18$$

$$3(3C - 2 - 4C) = 3(6)$$

$$-C - 2 = 6, -C = 8, C = -8$$

$$17) 14M - 42 + 56M = 28$$

$$14(M - 3 + 4M) = 14(2)$$

$$5M - 3 = 2$$

$$5M = 5, M = 1$$

$$18) 6A - 16 - 4A = 20$$

$$2(3A - 8 - 2A) = 2(10)$$

$$A - 8 = 10, A = 18$$